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Claims

[c1] 1. A method for manufacturing a buried insulating layer type semiconductor silicon carbide substrate within a film formation chamber after placing, in this film formation chamber, an SOI substrate having a buried insulating layer positioned on a silicon substrate and a surface silicon layer formed on this buried insulating layer, wherein the method for manufacturing a buried insulating layer type semiconductor silicon carbide substrate is characterized by comprising a first step of irradiating the surface silicon layer of the SOI substrate with infrared rays while supplying a mixed gas of hydrogen gas and hydrocarbon gas into the film formation chamber and, thereby, raising the temperature of the surface silicon layer to that required for metamorphosing the surface silicon layer into a single crystal silicon carbide thin film wherein this condition is maintained for a predetermined period of time so that the surface silicon layer is metamorphosed into a single crystal silicon carbide thin film.

[c2] 2. The method for manufacturing a buried insulating layer type semiconductor silicon carbide substrate according to Claim 1, wherein the method for manufactur-

ing a buried insulating layer type semiconductor silicon carbide substrate is characterized by comprising: a second step of maintaining the same condition as of said first step for a predetermined period of time after said first step and, thereby, depositing a carbon thin film on said single crystal silicon carbide thin film; and a third step of replacing said mixed gas with an inert gas with oxygen gas mixed at a predetermined ratio and at the same time, achieving the temperature required for etching and removing said carbon thin film through the control of the irradiation of the infrared rays wherein this condition is maintained for a predetermined period of time so that the carbon thin film is etched and removed.

[c3] 3. The method for manufacturing a buried insulating layer type semiconductor silicon carbide substrate according to Claim 2, wherein the method for manufacturing a buried insulating layer type semiconductor silicon carbide substrate is characterized by comprising: a fourth step of replacing said inert gas with a pure inert gas with no oxygen gas mixed in after said third step and, after that, achieving the temperature required for making a new single crystal silicon carbide thin film to grow on said single crystal silicon carbide thin film through the control of the irradiation of the infrared rays while supplying a mixed gas of hydrogen gas and a

silane based gas into the pure inert gas atmosphere wherein this condition is maintained for a predetermined period of time so that a new single crystal silicon carbide thin film is made to grow on the single crystal silicon carbide thin film.

[c4] 4. The method for manufacturing a buried insulating layer type semiconductor silicon carbide substrate according to Claim 3, wherein the method for manufacturing a buried insulating layer type semiconductor silicon carbide substrate is characterized in that said SOI substrate is a SIMOX substrate.

[c5] 5. The method for manufacturing a buried insulating layer type semiconductor silicon carbide substrate according to Claim 3, wherein the method for manufacturing a buried insulating layer type semiconductor silicon carbide substrate is characterized in that the film thickness of said surface silicon layer is 10 nm or less.

[c6] 6. The method for manufacturing a buried insulating layer type semiconductor silicon carbide substrate according to Claim 3, wherein the method for manufacturing a buried insulating layer type semiconductor silicon carbide substrate is characterized in that the air pressure within the film formation chamber is set at atmospheric pressure.

[c7] 7. A device for manufacturing a buried insulating layer type single crystal silicon carbide substrate within a film formation chamber after placing, in this film formation chamber, an SOI substrate having a buried insulating layer positioned on a silicon substrate and a surface silicon layer formed on this buried insulating layer, wherein the manufacturing device for a buried insulating layer type silicon carbide substrate is characterized by comprising: the film formation chamber in which an SOI substrate is placed; a gas supplying means for supplying various types of gasses required for the manufacture of a buried insulating layer type semiconductor silicon carbide substrate into the film formation chamber; an infrared ray irradiating means for irradiating the surface silicon layer of the SOI substrate with infrared rays; and a control means for controlling the gas supplying means and the infrared ray irradiating means, wherein said control part irradiates the surface silicon layer of the SOI substrate with infrared rays while supplying a mixed gas of hydrogen gas and hydrocarbon gas into the film formation chamber, thereby raises the temperature of the surface silicon layer to that required for metamorphosing the surface silicon layer into a single crystal silicon carbide thin film, and maintains this condition for a predetermined period of time so that the surface silicon layer

is metamorphosed into a single crystal silicon carbide thin film.

[c8] 8. The manufacturing device for a buried insulating layer type semiconductor silicon carbide substrate according to Claim 7, wherein the manufacturing device for a buried insulating layer type semiconductor silicon carbide substrate is characterized in that said control part continues the process for metamorphosing the surface silicon layer into a single crystal silicon carbide thin film for a predetermined period of time after the start of said process, thereby deposits a carbon thin film on said single crystal silicon carbide thin film and, after that, replaces said mixed gas with an inert gas mixed with oxygen gas at a predetermined ratio and at the same time, achieves a temperature required for etching and removing said carbon thin film through the control of the irradiation of the infrared rays, and maintains this condition for a predetermined period of time so that the carbon thin film is etched and removed.

[c9] 9 The manufacturing device for a buried insulating layer type semiconductor silicon carbide substrate according to Claim 8, wherein the manufacturing device for a buried insulating layer type semiconductor silicon carbide substrate is characterized in that said control part replaces said inert gas with a pure inert gas with no oxy-

gen gas mixed in after the process for etching and removing said carbon thin film and, after that, achieves a temperature required for making a new single crystal silicon carbide thin film to grow on said single crystal silicon carbide thin film through the control of the irradiation of the infrared rays while supplying a mixed gas of hydrogen gas and a silane based gas into the pure inert gas atmosphere, and maintains this condition for a predetermined period of time so that a new single crystal silicon carbide thin film is made to grow on the single crystal silicon carbide thin film.

[c10] 10. The manufacturing device for a buried insulating layer type semiconductor silicon carbide substrate according to Claim 9, wherein the manufacturing device for a buried insulating layer type semiconductor silicon carbide substrate is characterized in that said SOI substrate is a SIMOX substrate.

[c11] 11. The manufacturing device for a buried insulating layer type semiconductor silicon carbide substrate according to Claim 9, wherein the manufacturing device for a buried insulating layer type semiconductor silicon carbide substrate is characterized in that the film thickness of said surface silicon layer is 10 nm or less.

[c12] 12. The manufacturing device for a buried insulating

layer type semiconductor silicon carbide substrate according to Claim 9, wherein the manufacturing device for a buried insulating layer type semiconductor silicon carbide substrate is characterized in that the air pressure within the film formation chamber is set at atmospheric pressure.

[c13] 13. The manufacturing device for a buried insulating layer type semiconductor silicon carbide substrate according to Claim 9, wherein the manufacturing device for a buried insulating layer type semiconductor silicon carbide substrate is characterized in that the position of said infrared ray irradiating means is adjustable.

[c14] 14. The manufacturing device for a buried insulating layer type semiconductor silicon carbide substrate according to Claim 13, wherein the manufacturing device for a buried insulating layer type semiconductor silicon carbide substrate is characterized in that said infrared ray irradiating means is placed outside a transparent film formation chamber.

[c15] 15. The manufacturing device for a buried insulating layer type semiconductor silicon carbide substrate according to Claim 7, 8, 9, 10, 11, 12, 13 or 14, wherein the manufacturing device for a buried insulating layer type semiconductor silicon carbide substrate is charac-

terized by comprising a gas processing means for processing a gas supplied into said film formation chamber.